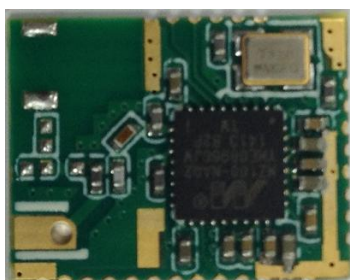


# HF-Z100 ZigBee Module Datasheet

V 1.3



## TABLE OF CONTENTS

LIST OF FIGURES .....	2
LIST OF TABLES .....	2
HISTORY .....	2
1. PRODUCT OVERVIEW .....	3
1.1. General Description .....	3
1.2. Device Features .....	3
1.3. Device Parameters .....	4
1.4. Key Application .....	4
2. HARDWARE INTRODUCTION .....	5
2.1. Pins Definition .....	5
2.2. Electrical Characteristics .....	6
2.3. Mechanical Size .....	6
2.4. Antenna .....	7
2.5. Evaluation Kit .....	9
2.6. Order Information .....	10
2.7. Typical Application .....	10
3. PACKAGE INFORMATION .....	11
3.1. Recommended Reflow Profile .....	11
3.2. Device Handling Instruction (Module IC SMT Preparation) .....	11
3.3. Shipping Information .....	12
APPENDIX A: HW REFERENCE DESIGN .....	13
APPENDIX B: CONTACT INFORMATION .....	14

## LIST OF FIGURES

Figure 1.	HF-Z100 Overview .....	5
Figure 2.	HF-Z100 Pins Map .....	5
Figure 3.	HF-Z100 Mechanical Dimension .....	7
Figure 4.	HF-Z100 Suggested Wire Antenna Position .....	8
Figure 5.	HF-Z100 through hole PAD Position .....	8
Figure 6.	HF-Z100 with Chip Antenna Suggested Placement.....	8
Figure 7.	HF-Z100 Evaluation Kit .....	9
Figure 8.	HF-Z100 Order Information .....	10
Figure 9.	HF-Z100 Hardware Typical Application .....	10
Figure 10.	Reflow Soldering Profile .....	11
Figure 11.	Shipping Information .....	12

## LIST OF TABLES

Table 1.	HF-Z100 Module Technical Specifications.....	4
Table 2.	HF-Z100 Pins Definition .....	5
Table 3.	Operation Parameters .....	6
Table 4.	RF Parameters .....	6
Table 5	HF-Z100 Evaluation Kit Interface Description .....	9
Table 6.	Reflow Soldering Parameter .....	11

## HISTORY

<b>Ed.V1.0</b>	04-10-2014	First Version.
<b>Ed.V1.1</b>	05-18-2014	Update Antenna Option and add EVK information.
<b>Ed.V1.1</b>	08-27-2014	Remove internal antenna type and modify order information.

# 1. PRODUCT OVERVIEW

## 1.1. General Description

The HF-Z100 is a fully self-contained, small form-factor, IEEE802.15.4 Zigbeemodulewith low complexity, self-organizing, lowpower, low costfeature.It is based on IEEE802.15.4 standard, can be coordinated to achieve communication between the thousands of tiny sensors that require very little energy to relay the data through radio waves from one sensor to another sensor, thus withhigh communication efficiency.

The HF-Z100 employs the world's lowest power consumption embedded architecture. It has been optimized for all kinds of Zigbee applications in the home automation, smart grid, smart lighting, handheld device, personal medical application and industrial control that have lower data rates, and transmit or receive data on an infrequent basis.

The HF-Z100 integrates all IEEE802.15.4 Zigbee functionality into a low-profile,15.6x12.2x2.0mmSMT module package that can be easily mounted on main PCB with application specific circuits. Also, module provides built-in antenna, external antenna option.

## 1.2. Device Features

- Size: 15.6x12.2x2.0mm Smallest size module;
- High RX sensitivity:  $\leq -101\text{dBm}$ ;
- Excellent link budget:  $> 110\text{dB}$ ;
- Max output power:  $9\text{dBm} \pm 1.5\text{dBm}$ ;
- Extend OperationTemperture:  $-40^{\circ}\text{C} - 110^{\circ}\text{C}$  for smart lighting application;
- Low power consumption:
  - Operating Current:  $< 60\text{mA}$
  - Deep Sleep Current:  $< 10\mu\text{A}$
- 512KB Internal Flash, 160KB SRAM resource for customized application;
- Full Zigbee ZHA/ZLL profile supported;
- Various peripherals interface:
  - 15 x GPIO ports
  - 3 x 16-bit ADC input channel
  - 2 x UART with hardware flow control
  - 5 x PWM inerface
  - 1 x I2C interface
  - SWD debug interface
- Power Supply Range from 2V to 3.6V, support battery supply application;
- High performance on-board antenna and PAD/HOLE for external antenna option;
- CE/FCC/RoHS certification;

### 1.3. Device Parameters

Table 1. HF-Z100 Module Technical Specifications

Class	Item	Parameters
<b>Wireless Parameters</b>	Certification	FCC/CE
	Wireless Standard	802.15.4
	Radio Data Rate	250Kbps @2.4GHz
	Frequency Range	2.4~2.4835GHz
	Transmit Power	9 +/-1.5dBm
	ReceiverSensitivity	≤-101dBm
	Antenna Option	External: PAD for external ANT
<b>Hardware Parameters</b>	Data Interface	UART,ADC I2C,GPIO
	Operating Voltage	2.0~3.6V
	Operating Current	< 60mA
	Deep Sleep Current	<10uA
	Communication Distance	Indoor 30m,Outdoor 100m
	Operating Temp.	-40℃ - 110℃
	StorageTemp.	-45℃ - 125℃
	Dimensions and Size	15.6x12.2x2.0mm

### 1.4. Key Application

- Illumination control
- HVAC monitoring and control
- Building automation
- Access Control
- Security system
- Industrial automation
- Automated metering
- Smart energy

## 2. HARDWARE INTRODUCTION

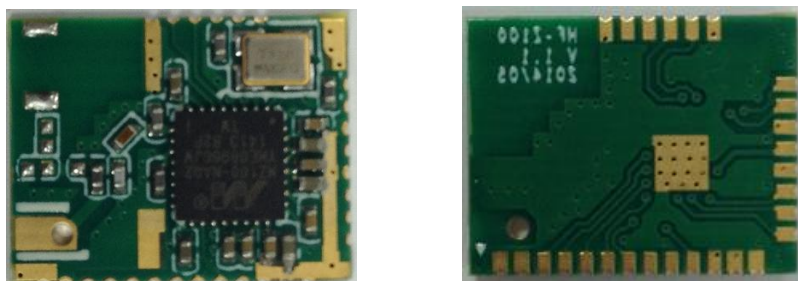


Figure 1. HF-Z100 Overview

### 2.1. Pins Definition

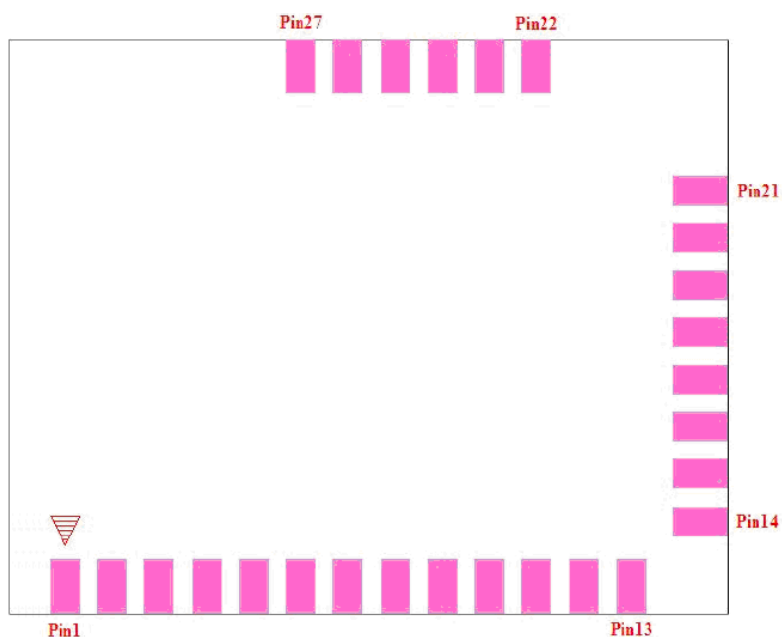


Figure 2. HF-Z100 Pins Map

Table 2. HF-Z100 Pins Definition

Pin	Net Name	Description
1~2	GND	Ground
3	GPIO12	PWM output-1 (Timer1)
4	GPIO13	PWM output-2 (Timer1)
5	GPIO14	SWD Clock
6	GPIO15	SWD Data
7	GPIO16	IIC SDA
8	VIO	<b>IO Power (2.0~3.6V)</b>

Pin	Net Name	Description
9	GPIO17	IIC CLK
10	GPIO18	PWM output-3 (Timer1)
11~13	GND	Ground
14	GPIO21	UART2_TXD
15	GPIO22	PWM output-4 (Timer1) UART2_RXD
16	GPIO23	PWM output-5 (Timer1)
17	GND	Ground
18	VBAT	<b>Main Power (2.0~3.6V)</b>
19	GND	Ground
20	GPIO29	Reserve
21	GPIO28	Enable
22	GND	Ground
23	RESET_N	The reset signal
24	GPIO4	ADCx3 or ADCx1 And Wakeup INTx2
25	GPIO5	
26	GPIO6	
27	GND	Ground

## 2.2. Electrical Characteristics

Table 3. Operation Parameters

Parameter	Condition	Min.	Typ.	Max.	Unit
Operating Supply voltage		2.0	3.3	3.6	V
RX Current	Active CPU 32MHz		21		mA
TX Current	Active CPU 32MHz, +9dBm		34		mA
Deep Sleep Current			10		uA

Table 4. RF Parameters

Parameter	Ratings	Unit
Operating Frequency	2.4~2.4835	GHz
IF Frequency	4	MHz
Quantity of Channel	16	
Number of Channeels	11~26	
Max TX Power	9	dBm
RX Seneitivity	~104	dBm
Data Rate	250	KBS

## 2.3. Mechanical Size

HF-Z100 modules detailed mechanical data is referred to as following Figure(Unit is Mil).

The pad size:25mil X 45mil, pin pitch is 40mil.

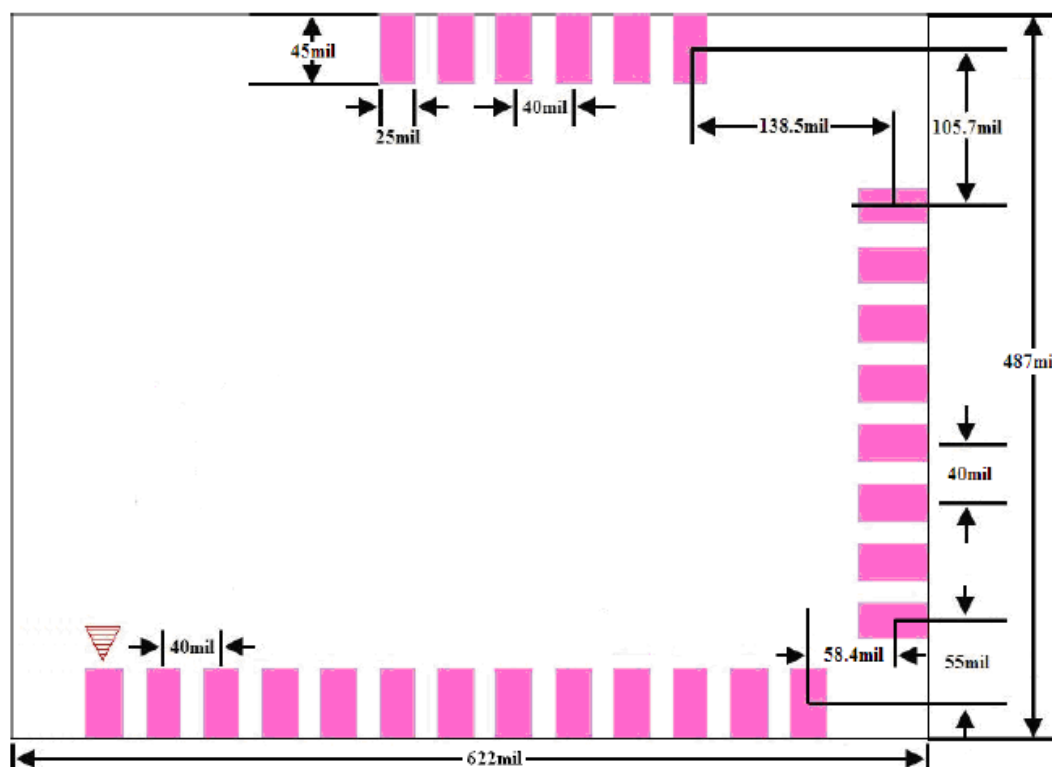


Figure 3. HF-Z100 Mechanical Dimension

## 2.4. Antenna

HF-Z100 module support external wire antenna option. Wire antenna is flexible to avoid the metal affect or the other on RF performance in LED lighting because it is not fixed on board like chip antenna and can be go out externally.

The position for the assembly of wire antenna on board refer to Figure 4, user can select horizontal direction through the SMT PAD or vertical direction through the Through Hole PAD based on dedicated application.

When customer select internal antenna (**internal antenna is supported by HF-Z100A, choose HF-Z100A for internal antenna support**), you shall comply with following antenna design rules and module location suggestions:

- For user PCB, RED color region (6x5mm) can't put component or paste GND net;
- Antenna must away from metal or high components at least 10mm;
- Antenna can't be shielded by any meal enclosure. All cover, include plastic, shall away from antenna at least 10mm;

High-Flying suggest HF-Z100 module better locate in following region at customer board as Figure 5, which to reduce the effect to antenna and wireless signal, and better consult High-Flying technical people when you structure your module placement and PCB layout.

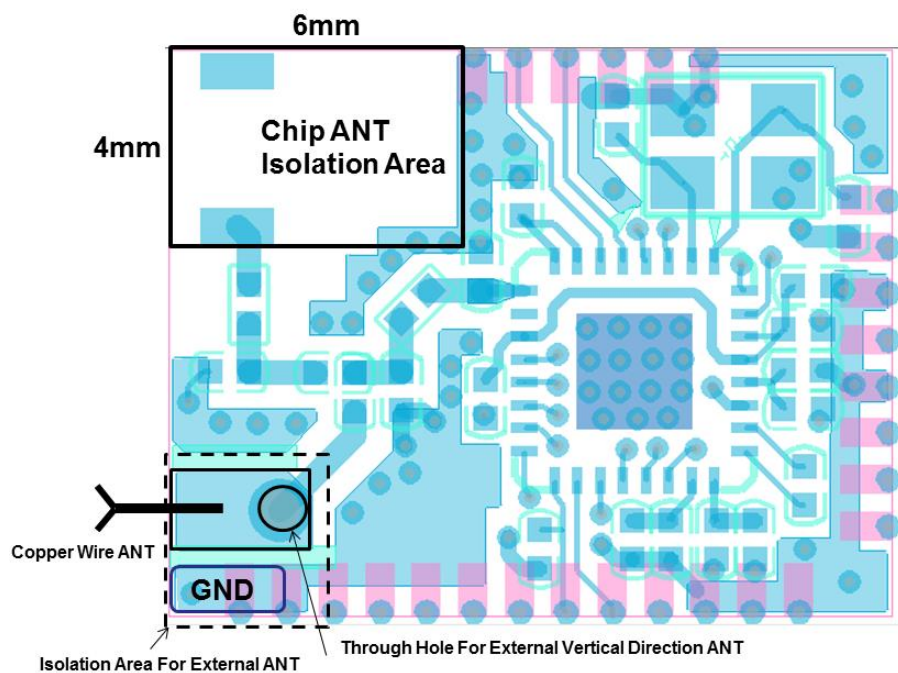


Figure 4. HF-Z100 Suggested Wire Antenna Position

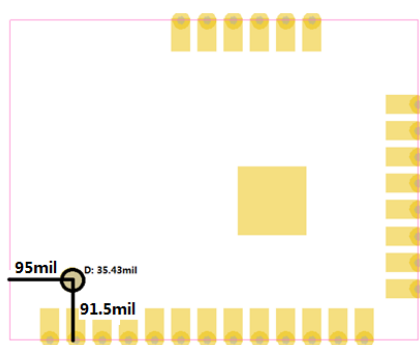


Figure 5. HF-Z100 through hole PAD Position

The through hole PAD Position:

X: 95mil; Y: 91.5mil; Dia.: 35.43mil

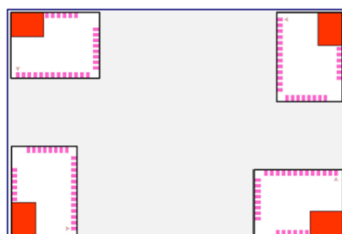


Figure 6. HF-Z100 with Chip Antenna Suggested Placement



## 2.5. Evaluation Kit

High-Flying provides the evaluation kit to promote user to familiar the product and develop the detailed application. The evaluation kit shown as below, user can connect to HF-Z100 module with the UART (USB), or SWD Debugger port to configure the parameters, manage the module or do the some functional tests.

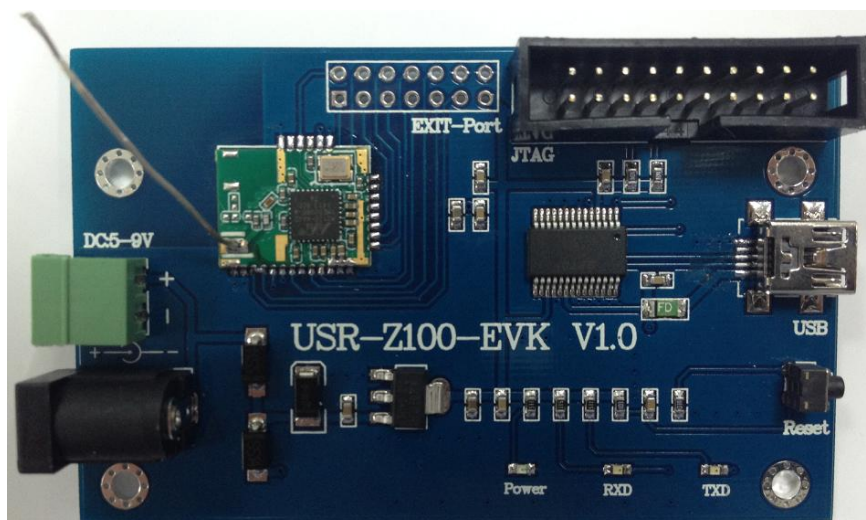


Figure 7. HF-Z100 Evaluation Kit

**Notes:** User need consult high-flying for software SDK support or more detailed debug support. The external interface description for evaluation kit as follows:

Table 5 HF-Z100 Evaluation Kit Interface Description

Function	Name	Description
External Interface	JTAG	JTAG data debug interface (Not for user use)
	USB	UART to USB debug interface. (For PC without RS232, need load driver). Can be Power input.
	DC Jack	DC jack for power in, 5~9V input.
	DC5-9V	DC jack for power in, 5~9V input.
	EXT PORT	HF-Z100 GPIO function extend interface connector
LED	Power	3.3V Power Indicator
	TXD	UART TXD Indicator
	RXD	UART TXD Indicator
Button	nReset	Used to reset the module.

## 2.6. Order Information

Base on customer detailed requirement, HF-Z100 series modules provide different variants and physical type for detailed application.

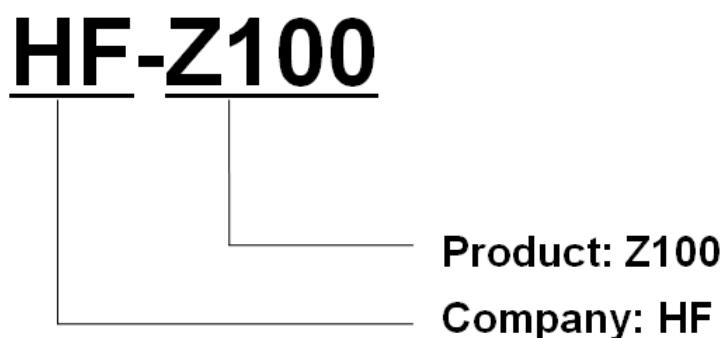


Figure 8. HF-Z100 Order Information

## 2.7. Typical Application

The module basic reference schematic is referred to following,

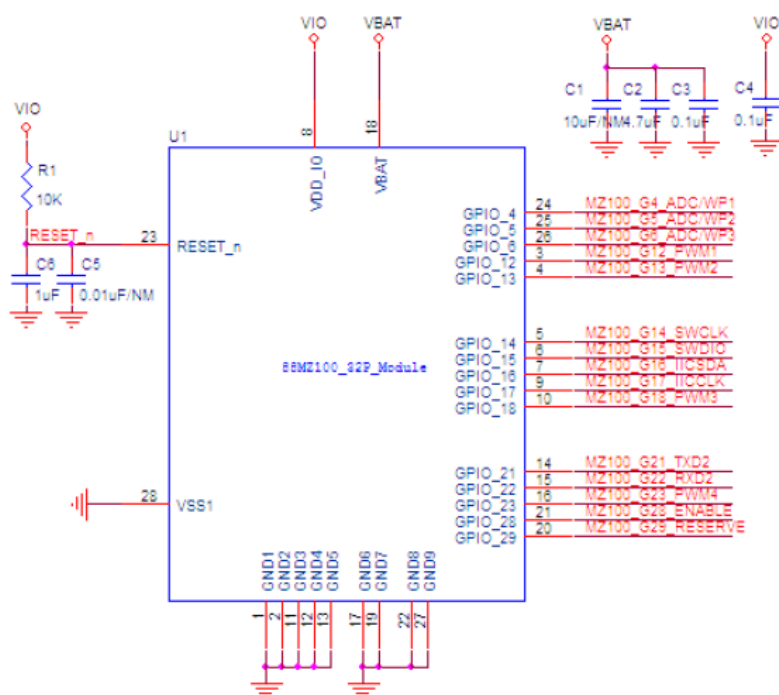


Figure 9. HF-Z100 Hardware Typical Application

**Notes:** If HF-Z100 GPIO6 (RXD) and GPIO4 (TXD) are not used for ADC and Wakeup function, suggesting them as the default UART download port.

## 3. PACKAGE INFORMATION

### 3.1. Recommended Reflow Profile

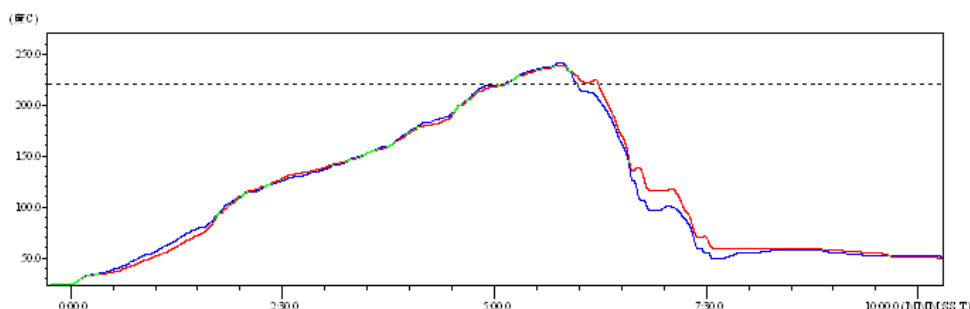


Figure 10. Reflow Soldering Profile

Table 6. Reflow Soldering Parameter

NO.	Item	Temperature (Degree)	Time(Sec)
1	Reflow Time	Time of above 220	35~55 sec
2	Peak-Temp	260 max	

- Note:**
1. Recommend to supply N2 for reflow oven.
  2. N2 atmosphere during reflow ( $O_2 < 300\text{ppm}$ )

### 3.2. Device Handling Instruction (Module IC SMT Preparation)

1. Shelf life in sealed bag: 12 months, at  $<30^\circ\text{C}$  and  $<60\%$  relative humidity (RH)
2. After bag is opened, devices that will be re-baked required after last baked with window time 168 hours.
3. Recommend to oven bake with N2 supplied
4. Recommend end to reflow oven with N2 supplied
5. Baked required with  $24\text{ hours}$  at  $125 \pm 5^\circ\text{C}$  before rework process for two modules, one is new module and two is board with module
6. Recommend to store at  $\leq 10\%$  RH with vacuum packing
7. If SMT process needs twice reflow:
  - (1) Top side SMT and reflow
  - (2) Bottom side SMT and reflow

Case 1: Zigbee module mounted on top side. Need to bake when bottom side process over 168 hours window time, no need to bake within 168 hours

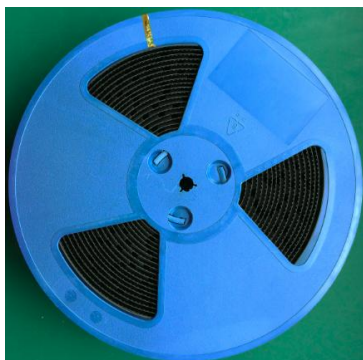
Case 2: Zigbee module mounted on bottom side, follow normal bake rule before process

**Note:** Window time means from last bake end to next reflow start that has 168 hours space.

### 3.3. Shipping Information

#### TAPE

Size:TBD



#### BOX

Size: TBD



Figure 11. Shipping Information

To Be Discussed

[illegible]

- 13 -

## APPENDIX B: CONTACT INFORMATION

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**Address:** Room.511/510, Building 7, No.365, Chuanhong Road, Pudong New Area,  
Shanghai, China, 201202

**Web:** [www.hi-flying.com](http://www.hi-flying.com)

**Service Online:** 400-189-3108

**Sales Contact:** [sales@hi-flying.com](mailto:sales@hi-flying.com)

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